Distribution of Acid Deoxyribonuclease in Different Tissues and Species

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Acid deoxyribonuclease (DNase) has been recently prepared as a homogeneous protein from hog spleen (Bernardi, Griffé & Appella, 1963; Bernardi & Griffé, 1964) and shown to degrade deoxyribonucleic acid (DNA) according to both a 'single hit' and a 'double hit' kinetics (Bernardi & Sadron, 1961; 1964). While the latter mechanism of degradation is originated by random breaks on one or the other strand, the former apparently occurs through the simultaneous splitting of both strands at the same level.

As an approach to the problem of the biological significance of acid DNase, it was attempted to establish whether the acid DNase activities found by many authors in different tissues and species (see Laskowski, 1961, for a review) were carried by similar protein molecules or not. This question was studied by comparing (i) the chromatographic behaviour of crude acid DNase preparations (Bernardi, 1961) on Sephadex G-75, DEAE-cellulose and hydroxyapatite; (ii) some basic enzymological properties of the chromatographically purified preparations, like the pH–activity curves and the effect of SO_4^{2-}, Mg^{2+} and EDTA on activity; (iii) the sedimentation coefficients; these were determined according to Martin & Ames (1961).

Essentially the same chromatographic, enzymological and ultracentrifugal properties were found for enzyme preparations from lymphatic tissues (hog spleen, calf spleen, calf thymus), tumour tissues (AKR mouse sarcoma, C_3H mouse mammary epithelioma), non-multiplying cells (chicken erythrocytes, hog erythrocytes, mackerel spermatozoa), human urine and an invertebrate, the clam *M. mercenaria*. The enzyme levels varied greatly according to the sources, the highest ones being present in the rapidly multiplying tissues.

These results indicate that, at least in the explored cases, the acid DNase activity is bound to protein molecules with very similar properties, and suggest that the enzyme might be present in all cells of multicellular organisms.

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